

# Decelerating the retreat

According to generally accepted projections, forest zones of Europe will shift polewards during this century. The expected changes of climate will cause an expansion in the North but a retreat in the South. Mainly due to its effects on biodiversity and landscapes, the shift is receiving wide public attention. It is, however, largely overlooked that the retreat of forests at the trailing boundary (addressed as 'migration') manifests itself as ugly epidemics and mass mortality. Such events are not unknown in forestry. During the forest decline events in Central Europe of the 1970s and 1980s, losses were so serious that forest mortality data were declared secret in some countries.

A zone particularly threatened is the low-elevation region of East and Southeast Europe. In this area, projected climate changes are more severe than in the northern part of the continent. The extent of impacts on land cover is expected to be two to three magnitudes larger because changes affect disproportionately larger tracts on plains than on mountains. The increasing frequency of droughts threatens the stability and ecological services of forest ecosystems. Most of the countries in the region are in an economic and social transition phase, experiencing a rapid restructuring, which also influences land use and the sustainability of resource use.

In the face of these challenges, our understanding of how forests will respond at the trailing ends is surprisingly insufficient. Although issues of global change are in the focus of international research and politics, mainstream research as well as European policy leaves the

specific problems of continental Southeast Europe largely unconsidered. Even in the region itself, there is a lack of appreciation of the specific nature of these threats.

The reason has to be sought only partially in the geographically and thematically peripheral character of the problem. First of all, there is insufficient awareness and inadequate collaboration in climate impact research and adaptation in SE Europe.

We believe that three main tasks have to be accomplished almost simultaneously, due to the urgency of the issue:

- Identification of the specific problems needs more focused research and critical assessments. The complexity of issues requires trans-disciplinary cooperation in research and development;
- Formulation of solutions calls for practice-oriented and sometimes unconventional approaches, and for revisiting of inherited dogmas. Policy concepts and strategy principles have to be reviewed and adapted;
- Collaboration among countries on regional and wider level has to be urgently developed, initiating projects and utilising existing international networks and agencies.

Any progress in adaptation to climate change requires well conceived strategies and plans, a sound legal framework and an effective system to monitor developments. National climate change strategies and national forest strategy documents are particularly important. In many countries in the region, these documents do not contain specific references to adaptation actions in the forest sector. Initiatives to formu-

*Stability of SE European forest cover – a crucial issue...*



*Fig. 1: Wooden structures are durable carbon sinks: their role in the national carbon balance is investigated in the project (a lookout tower designed by the university team)*

late management guidelines and concrete measures ('best practice') for adapting to climate change are needed. Criteria and indicators of progress will have to be specified.

Permanent and reliable monitoring of climatic impacts has to be improved, taking into account the specific threats to forest ecosystems at the receding limits, to survey changes of site potential, of forest fire frequency, of insect and disease outbreaks and other disturbances in forest ecosystems. Forest damage statistics and health monitoring data have to be incorporated in the national forest information system. The realistic assessment of future climatic risks needs locally available weather and climate data as well as regional climatic and impact models. This is essential for effectively formulating the tasks of adaptation and mitigation.

It is crucial that countries have the capacities in the forestry sector to identify threats and implement appropriate measures. Some countries of the region have expertise in climate change vulnerability and impact



Fig. 2: More than half of the carbon of forest ecosystems is stored underground: soil sampling in a beech forest for carbon cycle modelling

assessments as well as in development of forest carbon projects. Still, in nearly all countries the organisations responsible for forest data collection (inventory), monitoring and supervision need strengthening.

Similarly, many countries need assistance in new climate change-related tasks, such as carbon accounting, the preparation and practical implementation of adaptation projects and the distribution of benefits. There is a need to upgrade professional education and postgraduate training to meet the specific challenges of climate change.

Research and development of technologies are needed to reduce the risks and increase resilience of forests in the region. Significant knowledge gaps exist in all countries, such as the effect of climate change on stability, productivity and vulnerability of forests, the climate tolerance and adaptability of main tree species or the carbon dynamics in forest ecosystems. We need to improve the methods of terrestrial and remote-sensing inventory and monitoring in order to identify effects, to specify measures and to forecast future impacts. The potential of supporting research through existing forest research networks has to be explored.

In the framework of the National Operative Program for Social Renewal

(TÁMOP), which is cofinanced by the European Union, the Hungarian Government has declared to take steps to strengthen scientific schools in higher education. The West Hungarian University has initiated the project TÁMOP 4.2.2. 'Forestry, Agriculture and Technologies of Renewable Energy Generation and the Effects of Climate Change' to address the above problems on a national scale. The proposal has received support as a collaborative venture of numerous institutes and faculties, coordinated by the

author. The five main thematic areas indicate the trans-disciplinary character of the project:

- Investigating the effect of climate change on ecological conditions, diversity, carbon cycling, etc. of forest ecosystems;
- Forecasting productivity of forests, reviewing forest and nature conservation policies and management guidelines;
- Analysing carbon/energy efficiency of timber manufacturing, assessment of the carbon sink role of durable wood products;
- Scrutinising efficiency of renewable energy resources of biotic origin (bio-fuels from annual plants and algae), and of agricultural and forest biomass technologies;
- Assessing regional, renewable abiotic energy potentials and social consequences of the changing environment (wind and solar energy, consequences of urbanisation).

Cooperation among the countries of the region needs further development. Our institute takes part in numerous respective projects and actions and is, among others, partner in the EVOLTREE network of excellence. However, present European projects do not sufficiently cope with the described problems yet. To broaden the potential for cooperation, we have

developed additional collaborative links through FAO and NEESPI.

The NEESPI (North Eurasian Earth Science Partnership Initiative) Focus Research Centre for Non-Boreal East Europe was established in 2008 at our institute in Sopron, Hungary, with the support of NASA and NOAA, to strengthen collaboration on regional climate change issues. A result of these efforts has been the development of a cooperative platform on climate change impacts on forest management for countries of Eastern Europe and Central Asia, organised under the auspices of the FAO Regional Office for Europe.

These initiatives contribute to mitigating climate change by advocating and strengthening the concept of sustainable forest management and recognising the crucial role of forests in climate change (eg. sequestering and hoarding carbon, biomass and biodiversity, protecting soil and water, interacting with climate as a forcing component). We believe that international collaboration is essential for the solution of these regional problems and emerging possibilities will assist countries through generating knowledge and raising awareness about forests, land use and climate change in the region.



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